

CLAIMS

1. A liquid crystal display comprising
- a) liquid crystal cell with rubbing directions of the top and bottom alignment layers that favor a twist angle of $\pm 22 \pm 5^\circ$;
- 5 b) an input polarizer with an angle of $\pm 45 \pm 5^\circ$ and an output polarizer at an angle of $\pm 68 \pm 5^\circ$;
- c) a chiral dopant added to the liquid crystal such that ratio of the thickness of the cell and the pitch of the liquid crystal twist is between 0.19 ± 0.1
- d) the thickness times the birefringence of the liquid cell being $0.27 \pm 0.1 \mu\text{m}$.
- 10 2. A liquid crystal display comprising
- a) liquid crystal cell with rubbing directions of the top and bottom alignment layers that favor a twist angle of $\pm 22 \pm 5^\circ$;
- b) an input polarizer with an angle of $\pm 45 \pm 5^\circ$ and an output polarizer at an angle
- 15 of $\pm 68 \pm 5^\circ$;
- c) a chiral dopant added to the liquid crystal such that the ratio of the thickness of the cell and the pitch of the liquid crystal twist is between 0.31 ± 0.15
- d) the thickness times the birefringence of the liquid cell being $0.55 \pm 0.15 \mu\text{m}$.
- 20 3. A liquid crystal display comprising
- a) liquid crystal cell with rubbing directions of the top and bottom alignment layers that favor a twist angle of $\pm 68 \pm 5^\circ$;
- b) an input polarizer with an angle of $\pm 45 \pm 5^\circ$ and an output polarizer at an angle of $\pm 23 \pm 5^\circ$;

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- c) a chiral dopant added to the liquid crystal such that the ratio of the thickness of the cell and the pitch of the liquid crystal twist is between 0.38 ± 0.2
- d) the thickness times the birefringence of the liquid cell being $0.80 \pm 0.2 \mu\text{m}$.
- 5 4. A liquid crystal display comprising
- a) liquid crystal cell with rubbing directions of the top and bottom alignment layers that favor a twist angle of $112 \pm 5^\circ$;
- b) an input polarizer with an angle of $\pm 45 \pm 5^\circ$ and an output polarizer at an angle of $23 \pm 5^\circ$;
- 10 c) a chiral dopant added to the liquid crystal such that the ratio of the thickness of the cell and the pitch of the liquid crystal twist is between 0.56 ± 0.3
- d) the thickness times the birefringence of the liquid cell being $1.05 \pm 0.2 \mu\text{m}$.
5. A liquid crystal display comprising
- 15 a) liquid crystal cell with rubbing directions of the top and bottom alignment layers that favor a twist angle of $\pm 158 \pm 5^\circ$;
- b) an input polarizer with an angle of $\pm 45 \pm 5^\circ$ and an output polarizer at an angle of $\pm 68 \pm 5^\circ$;
- c) a chiral dopant added to the liquid crystal such that the ratio of the thickness
- 20 of the cell and the pitch of the liquid crystal twist is between 0.69 ± 0.3
- d) the thickness times the birefringence of the liquid cell being $1.3 \pm 0.3 \mu\text{m}$.
6. A single polarizer reflective liquid crystal display comprising

a) liquid crystal cell with rubbing directions of the top and bottom alignment layers that favor a twist angle of $\pm 174 \pm 5^\circ$;

b) an input polarizer with an angle of $\pm 41 \pm 5^\circ$;

c) a chiral dopant added to the liquid crystal such that the ratio of the thickness
5 of the cell and the pitch of the liquid crystal twist is between 0.47 ± 0.3

d) the thickness times the birefringence of the liquid cell being $0.14 \pm 0.2 \mu\text{m}$.

7. A single polarizer reflective liquid crystal display comprising

a) liquid crystal cell with rubbing directions of the top and bottom alignment
10 layers that favor a twist angle of $\pm 133 \pm 5^\circ$;

b) an input polarizer with an angle of $\pm 32 \pm 5^\circ$;

c) a chiral dopant added to the liquid crystal such that the ratio of the thickness
of the cell and the pitch of the liquid crystal twist is between 0.24 ± 0.3

d) the thickness times the birefringence of the liquid cell being $0.14 \pm 0.2 \mu\text{m}$.

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8. A single polarizer reflective liquid crystal display comprising

a) liquid crystal cell with rubbing directions of the top and bottom alignment
layers that favor a twist angle of $\pm 174 \pm 5^\circ$;

b) an input polarizer with an angle of $\pm 13 \pm 5^\circ$;

c) a chiral dopant added to the liquid crystal such that the ratio of the thickness
20 of the cell and the pitch of the liquid crystal twist is between 0.47 ± 0.3 .

d) the thickness times the birefringence of the liquid cell being $0.55 \pm 0.2 \mu\text{m}$.

9. A single polarizer reflective liquid crystal display comprising

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- a) liquid crystal cell with rubbing directions of the top and bottom alignment layers that favor a twist angle of $\pm 294 \pm 5^\circ$;
 - b) an input polarizer with an angle of $\pm 27 \pm 5^\circ$;
 - c) a chiral dopant added to the liquid crystal such that the ratio of the thickness
 - 5 of the cell and the pitch of the liquid crystal twist is between 0.50 ± 0.3
 - d) the thickness times the birefringence of the liquid cell being $0.6 \pm 0.2 \mu\text{m}$.

10. A single polarizer reflective liquid crystal display comprising

- a) liquid crystal cell with rubbing directions of the top and bottom alignment
- 10 layers that favor a twist angle of $\pm 107 \pm 5^\circ$;
- b) an input polarizer with an angle of $\pm 17 \pm 5^\circ$;
- c) a chiral dopant added to the liquid crystal such that the ratio of the thickness
- of the cell and the pitch of the liquid crystal twist is between 0.50 ± 0.3
- d) the thickness times the birefringence of the liquid cell being $0.27 \pm 0.2 \mu\text{m}$.

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11. A single polarizer reflective liquid crystal display comprising

- a) liquid crystal cell with rubbing directions of the top and bottom alignment
- layers that favor a twist angle of $\pm 220 \pm 5^\circ$;
- b) an input polarizer with an angle of $\pm 35 \pm 5^\circ$;
- 20 c) a chiral dopant added to the liquid crystal such that the ratio of the thickness
- of the cell and the pitch of the liquid crystal twist is between 0.50 ± 0.3
- d) the thickness times the birefringence of the liquid cell being $0.38 \pm 0.2 \mu\text{m}$.

12. A single polarizer reflective liquid crystal display comprising

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- a) liquid crystal cell with rubbing directions of the top and bottom alignment layers that favor a twist angle of $\pm 191 \pm 5^\circ$;
 - b) an input polarizer with an angle of $\pm 0.4 \pm 5^\circ$;
 - c) a chiral dopant added to the liquid crystal such that the ratio of the thickness of the cell and the pitch of the liquid crystal twist is between 0.50 ± 0.3
 - d) the thickness times the birefringence of the liquid cell being $0.6 \pm 0.2 \mu\text{m}$.

13. A single polarizer reflective liquid crystal display comprising

- 10
- a) liquid crystal cell with rubbing directions of the top and bottom alignment layers that favor a twist angle of $\pm 143 \pm 5^\circ$;
 - b) an input polarizer with an angle of $\pm 40 \pm 5^\circ$;
 - c) a chiral dopant added to the liquid crystal such that the ratio of the thickness of the cell and the pitch of the liquid crystal twist is between 0.50 ± 0.3
 - d) the thickness times the birefringence of the liquid cell being $0.7 \pm 0.2 \mu\text{m}$.

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14. A liquid crystal displays as claimed in any of claims 1 to 5 further comprising
- a) a transparent conductive electrode on one side of the liquid crystal cell; and
 - b) a transparent conductive electrode structure on the other side of the liquid crystal cell consisting of a conductive ground plane, an insulation layer on top of
- 20 such ground plane, and a top conductive electrode patterned into a comb shaped structure.

15. A liquid crystal display as claimed in claim 14 wherein said transparent
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- conductive electrodes are formed of indium tin oxide.

16. A liquid crystal display as claimed in any of claims 6 to 13 further comprising

a) a transparent conductive electrode on one side of the liquid crystal cell; and

b) a reflective conductive electrode on the other side of the liquid crystal cell consisting of a reflective and conductive ground plane, an insulation layer on top of such ground plane, and a top conductive electrode patterned into a comb shaped structure.

17. A liquid crystal display as claimed in any of claims 6 to 13 further comprising

a) a transparent conductive electrode on one side of the liquid crystal cell;

b) a reflective conductive electrode on the other side of the liquid crystal cell consisting of a reflective coating, a conductive ground plane, an insulation layer on top of such ground plane, and a top conductive electrode patterned into a comb shaped structure.

18. A liquid crystal display as claimed in claim 16 wherein the reflective electrode is made of aluminum.

19. A liquid crystal display as claimed in claims 16 and 17 wherein the comb shaped electrode is made of aluminum.

20. A liquid crystal display as claimed in any of claims 14 to 17 wherein the comb shaped electrode and the top transparent electrode are patterned to form a matrix structure with horizontal and vertical lines.

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